

**REMARKS**

**I. INTRODUCTION**

Claims 1, 2, 4, 7, 8, 10, 13, 14, 16, 18 and 20 have been amended above to clarify the subject matter recited therein. Claim 6 has been amended above to include the recitations of originally-filed claims 4 and 5, claim 12 has been amended above to include the recitations of originally-filed claims 10 and 11, and claim 18 has been amended above to include the recitations of originally-filed claims 16 and 17. The amendments to claims 6, 12 and 18 have not been made for any reason relating to patentability thereof. New claims 22-53 have been added. Accordingly, claims 1-53 are now under consideration in the above-referenced application. Provided above, please find a claim listing indicating the current amendment to the previously-pending claims on separate sheets so as to comply with the requirements set forth in 37 C.F.R. § 1.121. It is respectfully submitted that no new matter has been added.

**II. REJECTIONS UNDER 35 U.S.C. §§ 102(b) SHOULD BE WITHDRAWN**

Claims 1-5, 7-11, 13-17 and 19-21 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by U.S. Patent No. 6,493,572 issued to Su et al. (the "Su Patent"). It is respectfully asserted that the Su Patent does not disclose the subject matter recited in amended independent claims 1, 4, 7, 10, 13, 16 and 20 of the above-referenced application and the claims which depend therefrom for at least the reasons provided in greater detail herein below.

In order for a claim to be rejected as anticipated under 35 U.S.C. § 102, each and every element as set forth in the claim must be found, either expressly or

inherently described, in a single prior art reference. Manual of Patent Examining Procedures, § 2131; *see also Lindman Maschinenfabrik v. Am Hoist and Derrick*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

Applicant's invention, as recited in independent claims 1, 4, 7, 10, 13, 16 and 20, relates to a gradient coil arrangement that generates magnetic field gradients across the main magnetic field of a magnetic resonance imaging ("MRI") system.

With respect to amended independent claim 1, this claim relates to a coil arrangement which comprises, *inter alia*:

a first conductive member; and a second conductive member electrically coupled to the first conductive member, wherein the second conductive member forms a segment that has an approximate shape of an arc when viewed along a direction of extension of the first conductive member, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

Applicant's invention, as recited in amended independent claim 4, relates to a coil arrangement which comprises, *inter alia*:

a first conductive member arranged along a first axis; and a second conductive member arranged along a second axis which is approximately coaxial with the first axis; wherein the first conductive member is adapted to allow a first current to flow in a first direction, and the second conductive member is adapted to allow a second current to flow in a second direction which is opposite to the first direction, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

Additionally, Applicant's invention, as recited in amended independent claim 7, relates to a MRI system comprising a coil arrangement which comprises, *inter alia*:

a first conductive member; and a second conductive member electrically coupled to the first conductive member, wherein the second conductive member forms a segment that has an approximate shape of an arc when viewed along a direction of extension of the first conductive member, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

Turning to amended independent claim 10, this claim recites a MRI system comprising a coil arrangement which comprises, *inter alia*:

a first conductive member arranged along a first axis; and a second conductive member arranged along a second axis which is approximately coaxial with the first axis; wherein the first conductive member is adapted to allow a first current to flow in a first direction, and the second conductive member is adapted to allow a second current to flow in a second direction which is opposite to the first direction, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

In addition, Applicant's invention, as recited in amended independent claim 13, relates to a method of providing a coil arrangement which comprises, *inter alia*:

providing a first conductive member; and providing a second conductive member electrically coupled to the first conductive member, wherein the second conductive member forms a segment that has an approximate shape of an arc when viewed along a direction of extension of the first conductive member, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

Further, Applicant's invention, as recited in amended independent claim 16, relates to a method of providing a coil arrangement which comprises, *inter alia*:

providing a first conductive member arranged along a first axis; and providing a second conductive member arranged along a second axis which is approximately coaxial with the first axis; wherein the first conductive member is adapted to allow a first current to flow in a first direction, and the second conductive member is adapted to allow a second current to flow in a second direction which is opposite to the

first direction, and **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

Finally, Applicant's invention, as recited in amended independent claim 20, relates to a computer-readable medium for operating a MRI system comprising a coil arrangement comprising a first conductive member arranged along a first axis and a second conductive member arranged along a second axis which is approximately coaxial with the first axis, the computer-readable medium having a set of instructions operable to direct a processor to perform the steps of, *inter alia*:

permitting a first current to flow in a first direction in the first conductive member; and permitting a second current to flow in a second direction in the second conductive member, the second direction being opposite to the first direction, **wherein the first and second conductive members form at least one magnetic field gradient coil structure.**

The Su Patent relates to methods and apparatuses for magnetic resonance imaging, which involve an electromagnetically de-coupled sandwiched solenoidal array coil for receiving radio frequency ("RF") magnetic resonance signals in an MRI apparatus. (See Su Patent, col. 1, Ins. 6-10). Specifically, the Su Patent describes a RF receive coil array arrangement for enhancing magnetic resonance imaging. (See *id.*, col. 4, Ins. 56-58). Further, the Su Patent states that multiple solenoidal receive coils may be "sandwiched" together to form an RF coil array. (See *id.*, col. 6, Ins. 54-58). This arrangement is described as a sandwiched solenoidal array coil ("SSAC") in the Su Patent. (See *id.* col. 6, Ins. 38-67). Other than mere reference to coils for gradient magnetic fields, the Su Patent provides no description of any coils used to generate the gradient magnetic fields.

In clear contrast to the Applicant's claimed invention, the Su Patent does not disclose a coil arrangement in which, *inter alia*, **first and second conductive members form at least one magnetic field gradient coil structure**, as explicitly recited in independent claims 1, 4, 7, 10, 13, 16 and 20 of the above referenced application.

Indeed, the Su Patent describes a coil arrangement that contains various conductors that create RF coil arrays. (See Su Patent, col. 6, Ins. 54-58). However, the Su Patent does not describe any coil arrangement that contains **first and second conductive members that form at least one magnetic field gradient coil structure**. Although the RF coil arrays described in the Su Patent refer to "gradients" being produced by the RF coil arrays, these "gradients" are localized to the spatial variation of the RF field used for detecting the MRI signal from the subject, and not the gradient of the main magnetic field of the MRI. (See Su Patent, col. 6, Ins. 50-58; col. 11, Ins. 43-65). Essentially, the Su Patent describes RF gradient coils, but not **magnetic field gradient coils**. (See *id.*)

Further, in contrast to Applicant's claimed invention, the Su Patent relates to an entirely different portion of the MRI system. As described in the Su Patent, "[t]he preferred structural arrangements for RF receive coil 61 include the above discussed example SSAC embodiments of the present invention." (See Su Patent, col. 12, Ins. 41-44; and Fig. 13). In Figure 13 of the Su Patent, the SSAC and the RF Coil, referred to as elements 61 and 51, respectively, are shown as being separate from the coils for gradient magnetic fields, referred to as element 30. (See *id.*, col. 12, Ins. 19-28; and

Fig. 13). Therefore, the Su Patent effectively provides that the coils for gradient magnetic fields are wholly different from the SSAC and RF Coil in the MRI system. (See *id.*). Although the SSAC and RF Coil of the Su Patent are apparently equated by the Examiner to Applicant's claimed first and second conductive members, neither the SSAC and RF Coil, as described in the Su Patent, form first and second conductive members that form at least one magnetic field gradient coil structure. (See *id.*). When compared to the RF gradient coils, the coils or conductive members forming at least one magnetic field gradient coil structure applied to the magnetic field (as recited in the claims of the present invention) serve a different purpose and are entirely unique components in the MRI system. Therefore, the RF conductors described in the Su Patent cannot be equated to first and second conductive members that form at least one magnetic field gradient coil structure, as recited in amended independent claims 1, 4, 7, 10, 13, 16 and 20.

Accordingly, it is respectfully asserted that the Su Patent do not disclose the subject matter recited in amended independent claims 1, 4, 7, 10, 13, 16 and 20 or the claims which depend therefrom. Therefore, for at least the reasons set forth herein above, Applicant respectfully asserts that the rejection of claims 1-5, 7-11, 13-17 and 19-21 under 35 U.S.C. §§ 102(b) should be withdrawn.

### III. NEW CLAIMS 22-53

New claims 22-35 and 39-41, which depend from amended independent claims 1; new claims 36-38, which depend from amended independent claim 4; new claims 42-44, which depend from amended independent claim 6; new claim 45, which

depends from amended independent claim 7; new claim 46, which depends from amended independent claim 10; new claim 47, which depends from amended independent claim 12; new claims 48-49, which depend from amended independent claim 19; new claims 50-51, which depend from amended independent claim 20; and new claims 52-53, which depend from amended independent claim 21 have been added above to recite additional subject matter for Examiner's consideration. Support for these new claims can be found in the specification and the drawings. Applicant respectfully asserts that the subject matter recited in these new claims is patentable over the art relied on by the Examiner at least for the same reasons as provided above with reference to amended independent claims 1, 4, 6, 7, 10, 12, 13, 16, 18 and 20, and the claims which depend therefrom. A conformation of allowability of these new claims is thus respectfully requested.

#### IV. ALLOWABLE SUBJECT MATTER

Applicant thanks the Examiner for the confirmation that claims 6, 12 and 18 are objected to as being dependent on a rejected base claim, but would be allowed if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

As indicated above, claim 6 has been amended above to include the recitations of originally-filed claims 4 and 5, claim 12 has been amended above to include the recitations of originally-filed claims 10 and 11, and claim 18 has been amended above to include the recitations of originally-filed claims 16 and 17.

Accordingly, Applicant respectfully requests that the allowability of claims 6, 12 and 18 be confirmed in a subsequent communication.




**IV. CONCLUSION**

In light of the foregoing, Applicant respectfully submits that pending claims 1-53 are in condition for allowance. Prompt consideration, reconsideration and allowance of the present application are therefore earnestly solicited. If any issues remain outstanding, the Examiner is invited to contact the undersigned via the telephone number provided below.

Respectfully submitted,

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